

WHAT IS CLAIMED IS:

1. A process for coating a substrate with an organic thin film, comprising:
placing a substrate in a vacuum chamber;
preparing a mixture of at least one volatile liquid and at least one organic compound;
metering the mixture into a calibrated dispense volume;
evacuating the vacuum chamber;
purging the vacuum chamber with an inert gas;
bringing the level of pressure in the vacuum chamber to a controlled pressure;
introducing the mixture into the chamber through an ultrasonic nozzle, wherein a cloud of micro-droplets form and isotropically impact on the substrate, and wherein the substrate is coated with an organic thin film; and
drying the organic thin film.
2. The process of claim 1, wherein the step of drying includes purging the chamber with an inert gas.
3. The process of claim 1, wherein the substrate is a stent.
4. The process of claim 3, wherein the stent is coated with a restenosis inhibiting layer.
5. The process of claim 1, wherein the substrate is a SAWS.
6. The process of claim 5, wherein the SAWS is coated with an organic compound that captures a particular hazardous compound.
7. An ultrasonic nozzle assembly for atomizing a liquid and directing a separate source of gas around the nozzle for purging of a vacuum chamber with the source of gas, comprising:

a feed line comprising a coupling end and an output section end, wherein a liquid passage axially extends from the coupling end through the feed line and out of the output section end;

a front ultrasonic horn section;

a rear ultrasonic horn section;

at least one piezoelectric element, wherein the at least one piezoelectric element is sandwiched between the front horn section and the rear horn section;

an output section extending from the front ultrasonic horn section and terminating in an atomizing surface, wherein the feed line output section end couples with the output section, wherein the output section end of the feed line and the output section form a metal to metal seal, wherein a liquid passage axially extends through the output section, through the front horn section and the rear horn section to the coupling end of the feed line;

a coupling to the source of gas;

a housing, wherein the housing encloses the rear horn section and the piezoelectric element, and wherein the housing couples with the feedline, the output section, the source of gas and the vacuum chamber to form a vacuum seal, and wherein the housing comprises a gas passageway, a gas coupling, and a gas outlet, wherein the housing directs the source of gas around the ultrasonic nozzle and past the output section for purging of the vacuum chamber with the source of gas.

8. A process for coating a substrate with an organic thin film, comprising:
- placing a substrate in a vacuum chamber;
 - preparing an organic liquid;
 - metering the organic liquid into a calibrated dispense volume;
 - evacuating the vacuum chamber;
 - purging the vacuum chamber with a gas;
 - bringing the level of pressure in the vacuum chamber to a controlled pressure;
 - introducing the organic liquid into the chamber through an ultrasonic nozzle,
- wherein a cloud of micro-droplets form, and isotropically impact on the substrate, and wherein the substrate is coated with an organic thin film that is a product of a reaction involving the organic liquid; and
- drying the organic thin film.

9. The process of claim 8, wherein the organic liquid is hydroxy-functionalized silane.

10. An apparatus for coating a substrate with an organic thin film, comprising:

a vacuum chamber, wherein the substrate is disposed within the vacuum chamber;

a vacuum pump;

a vacuum valve, wherein the vacuum valve connects the vacuum chamber to the vacuum pump and wherein the vacuum valve selectively opens and closes;

at least one ultrasonic nozzle, having an inlet and an outlet disposed in a vacuum chamber, wherein the outlet extends into the vacuum chamber;

a calibrated dispense volume;

at least one source of a mixture of at least one volatile liquid and at least one organic compound;

a first valve, wherein the first valve selectively connects the at least one source to the calibrated dispense volume;

a second valve, wherein the second valve selectively connects the calibrated dispense volume to the ultrasonic nozzle;

at least one source of an inert gas;

at least one gas valve, wherein the at least one gas valve connects the at least one source of inert gas to the vacuum chamber; and

a process control system, wherein the process control system controls the vacuum pressure of the vacuum chamber by actuating the vacuum valve and the at least one gas valve, and wherein the process control system sequentially actuates the first and second valves, wherein a metered amount of the mixture contained in the at least one source is introduced into the calibrated dispense volume through the first valve, and is then supplied to the inlet end of said ultrasonic nozzle by said second valve, wherein the ultrasonic nozzle introduces the mixture into the vacuum chamber, whereby a cloud of micro-droplets is produced, whereby the micro-droplets in the cloud isotropically impact on the substrate, whereby the substrate is coated with an organic thin film.